

ED Machining of Particulate Reinforced Metal Matrix Composites

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Abstract : This paper reports the optimal process conditions for machining of three different types of metal matrix composites (MMCs): 65vol%SiC/A356.2; 10vol%SiC-5vol%quartz/Al and 30vol%SiC/A359 using PMEDM process. Metal removal rate (MRR), tool wear rate (TWR), surface roughness (SR) and surface integrity (SI) were evaluated after each trial and contributing process parameters were identified. The four responses were then collectively optimized using the technique for order preference by similarity to ideal solution (TOPSIS) and optimal process conditions were identified for each type of MMCS. The density of reinforced particles shields the matrix material from spark energy hence the high MRR and SR was observed with lowest reinforced particle. TWR was highest with Cu-Gr electrode due to disintegration of the weakly bonded particles in the composite electrode. Each workpiece was examined for surface integrity and ranked as per severity of surface defects observed and their rankings were used for arriving at the most optimal process settings for each workpiece.

Keywords : metal matrix composites (MMCS), metal removal rate (MRR), surface roughness (SR), surface integrity (SI), tool wear rate (TWR), technique for order preference by similarity to ideal solution (TOPSIS)

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